CLAIMS

What is claimed is:

1. An ionization gauge, comprising:

at least one electron source for generating electrons;

a collector electrode for collecting ions formed by the impact between the electrons and gas molecules; and

an electron window which isolates the least one electron source from the gas molecules.

2. The ionization gauge of claim 1, further comprising:

at least one acceleration electrode between the least one electron source and the electron window to accelerate the electrons to an energy which allows the electrons to be transmitted through the electron window; and

at least one deceleration electrode between the electron window and the collector electrode to decelerate the electrons.

3. The ionization gauge of claim 2, further comprising an anode between the deceleration electrode and the collector electrode.

4. The ionization gauge of claim 2, further comprising a mass filter between the deceleration electrode and the collector electrode.

5. The ionization gauge of claim 2, where the at least one acceleration electrode is maintained at an electric potential so that the potential difference between the least one electron source and the acceleration electrode is at a range of 100 volts to 10,000 volts.

6 The ionization gauge of claim 2, where the at least one deceleration electrode is maintained at an electric potential so that the potential difference between the electron window and the deceleration electrode is at a range of 0 volt to 10,000 volts.

7. The ionization gauge of claim 2, further comprising:

a second collector electrode between the electron window and the at least one deceleration electrode.

8. The ionization gauge of claim 1, further comprising:

a shield defining a shielded volume, the shield being at least partially open to permit transfer of the gas molecules into the shielded volume.

9. The ionization gauge of claim 8, where the shielded volume houses the least one electron source, the collector electrode, and the electron window.

10. The ionization gauge of claim 8, where the shield is maintained at a reference potential.

11. The ionization gauge of claim 10, where the reference potential is ground potential.

12. The ionization gauge of claim 1, where the gauge is a pressure gauge.

13. The ionization gauge of claim 1, where the gauge is of the Bayard-Alpert type.

14. The ionization gauge of claim 1, where the gauge is a residual gas analyzer.

15. The ionization gauge of claim 1, further comprising an anode defining an anode volume which retains the electrons in a region of the anode.

16. The ionization gauge of claim 15, where the collector electrode is within the anode volume.

17. The ionization gauge of claim 15, where the collector electrode is outside the anode volume.

18. The ionization gauge of claim 1, further comprising a mass filter for separating the ions based on mass-to-charge ratio.

19. A method of measuring a gas pressure from gas molecules and atoms, comprising the steps of:

producing electrons at least one electron source;

transmitting the electrons through an electron window, the electron window isolating the least one electron source from the gas molecules; and

collecting ions formed by impact between the electrons and the gas molecules and atoms on a collector electrode.

20. The method of claim 19, where the step of transmitting the electrons includes using at least one acceleration electrode, accelerating the electrons to an energy which allows the electrons to be transmitted through the electron window.

21. The method of claim 19, where the at least one acceleration electrode is maintained at an electric potential so that the potential difference between the least one electron source and the acceleration electrode is at a range of 100 volts to 10,000 volts.

22. The method of claim 19, where the step of collecting ions includes decelerating the electrons using at least one deceleration electrode.

23. The method of claim 22, where the at least one deceleration electrode is maintained at an electric potential so that the potential difference between the electron window and the deceleration electrode is at a range of 0 volt to 10,000 volts.

24. The method of claim 22, further comprising the step of:

collecting ions on a second collector electrode, the second collector electrode between the electron window and the at least one deceleration electrode.

25. The method of claim 19, further comprising the step of:

stabilizing the sensitivity using a shield, the shield defining a shielded volume, the shield is at least partially open to permit transfer of the gas molecules and atoms into the shielded volume so potentials external to the shield do not disturb the electric charge distribution within the shielded volume.

26. The method of claim 25, where the shielded volume houses the least one electron source, the collector electrode, and the electron window.

27. The method of claim 25, where the shield is maintained at a reference potential.

28. The method of claim 27, where the reference potential is ground potential.

29. The method of claim 19, where the collected ions are used to measure pressure.

30. The method of claim 19, where the collected ions are used to determine a gas type.

31. The method of claim 19, where the collector electrode is within an anode volume defined by an anode.

32. The method of claim 19, where the collector electrode is outside an anode volume defined by an anode.

33. The method of claim 19, further comprising separating the ions with a mass filter based on mass-to-charge ratio.

34. An ionization gauge, comprising:

means for producing electrons;

means for collecting ions formed by impact between electrons from at least one electron source and gas molecules; and

means for isolating the means for producing electrons from the gas molecules.